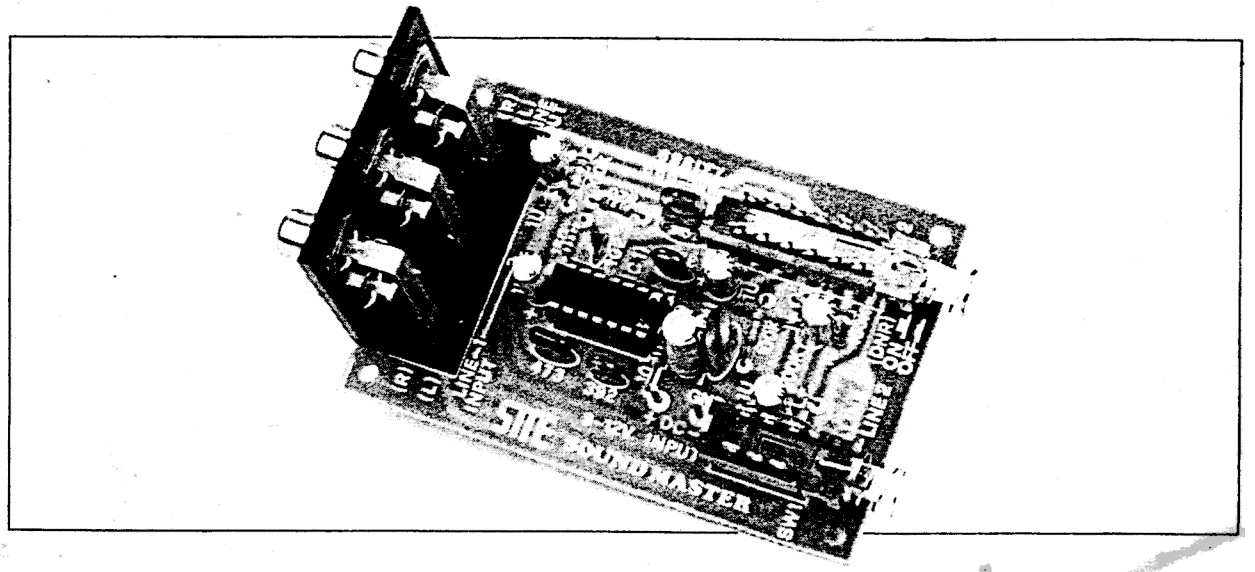
STEREO DYNAMIC NOISE REDUCTION MODULE SM666

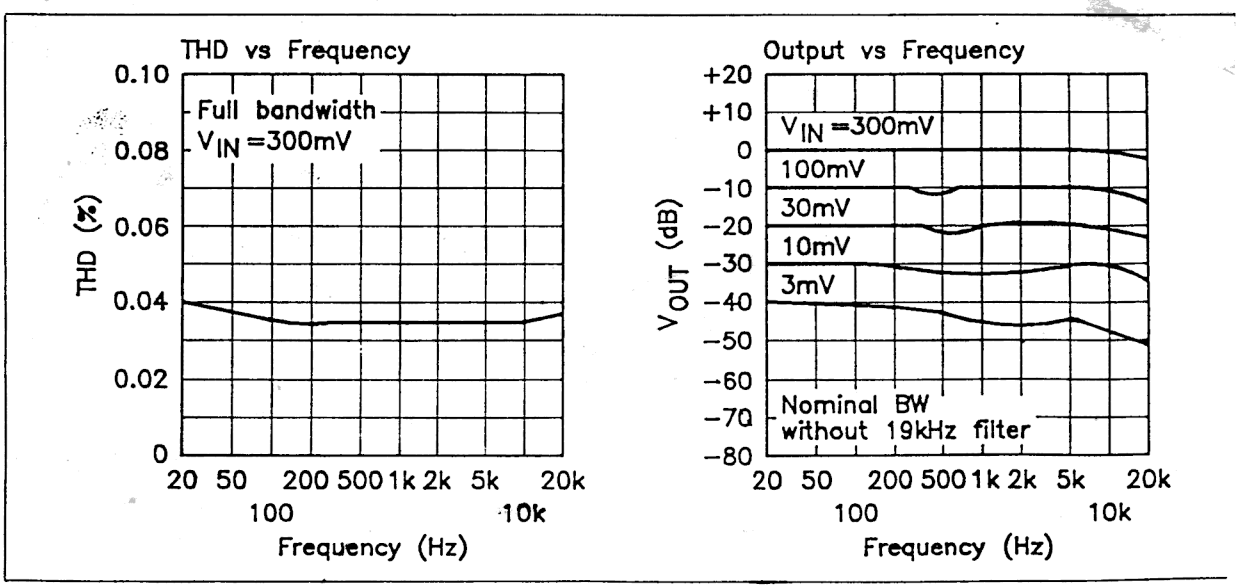


The SM666 Dynamic Noise Reduction System is specifically designed to reduce the noise from cassette tape, long play records and weak FM radio reception. The heart of the system is the LM1894 Dynamic Noise Reduction (DNR*) IC, which employs voltage controlled active filters offering attenuation of unwanted noise over a range of 10dB. The system does not encode recordings or require source material to be encoded (as with Dolby like systems), and is a 'playback only' processor operating with any music source including Dolby B encoded tapes.

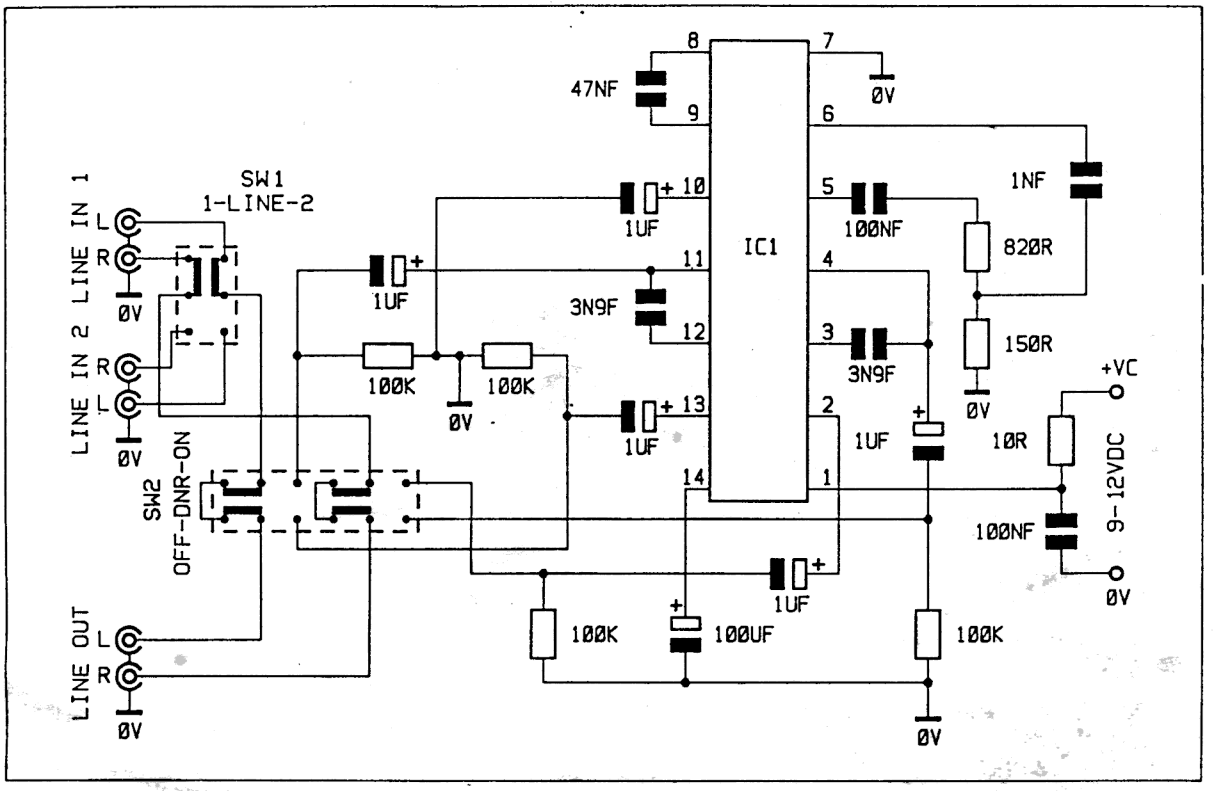
The module operates from a single 9 to 12V DC supply at 25mA average. It is provided with two pairs of line input phono sockets which can be selected via a pushbutton switch (SW1) as 'Line 1' or 'Line 2'. Output is via a stereo pair of phono sockets, and the DNR* can be bypassed or switched out of operation by a second pushbutton switch, SW2. In this mode the selected input is connected directly to the output.

While the DNR* is switched into operation, input impedance from Line 1 or 2 into the system is 20kΩ. For correct operation the maximum source signal level must be between 300mV and 3.5V r.m.s. (as measured at 1kHz), and if the source signal levels available are very small then an additional separate pre-amplifier is required at the input, to ensure that the 'noise threshold' of the system is exceeded at moderate to maximum signal levels for correct frequency response. The module *must not* follow any tone control or graphic equaliser stages but should precede them; source signals should have a flat frequency response, and record and tape sources must be pre-amplified and equalised first.

The SM666 DNR* module can be used as part of a music centre or Hi-Fi system and will be instrumental in reducing surface noise from records (many



Graphs Showing THD vs Frequency and Output vs Frequency.



Circuit Diagram of SM666.

modern records now include re-cycled vinyl and are of poorer quality than those of a decade or so ago), and noisy tape recordings not made with a Dolby like noise reduction process. As it stands the module offers noise reduction with a performance comparable to Dolby B.

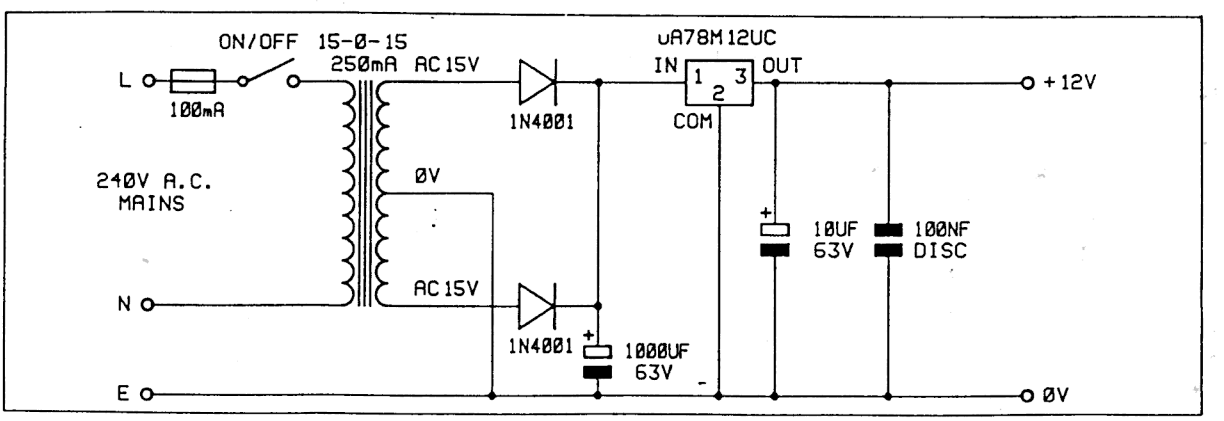
*DNR is a trademark of the National Semiconductor Corporation.

CONSTRUCTION

The PCB legend has been labelled with the actual values of the components to be fitted at these positions. The 'three figure' markings on the non-electrolytic capacitors follow the convention that the third digit indicates the number of zeros that must be added to the value indicated by the first two numbers. The final number is always in picofarads (pF). As examples, '39' plus two 0's = '3900pF'; this can also be read as 3n9F (3.9nF), and 0.0039μF. '473' is '47' plus three 0's or '47000pF' (also 47nF and 0.047μF), etc. You only need to match the component with a three figure number to the corresponding number on the PCB.

The longest lead of each radial electrolytic is usually the positive (+) lead, the other is identified by a black stripe and minus (−) sign on the body. These must be inserted into the PCB with regard to correct polarity, the hole for the positive lead is marked with a '+' on the board. On the board locations '1U' are for the 1μF electrolytics, '100U' for the 100μF component. The resistors are easier and should be matched against the appropriate figures on the board, e.g., 150Ω to '150', 100kΩ to '100K' etc. Positions of electrolytics are indicated by circles, non-electrolytics by lozenges and resistors by rectangles. Commence by fitting and soldering all resistors, followed by the non-electrolytic and then electrolytic capacitors.

Fit a wire link between the two holes marked 'J' beside SW2. Links can be fashioned from 24 s.w.g. tinned copper wire or from a left over component lead off-cut. Insert and solder the socket for IC1. Similarly identify and insert the two push switches SW1 and SW2 and solder in position. The two supply terminal pins are located at '+DC' and 'GND', and the six-way phono socket assembly fits directly at right-angles to the rear of the PCB. Two holes are provided in the PCB



Suggested Power Supply Circuit for the SM666.

for anchoring the socket base using self tapping screws. Solder the nine socket pins to the PCB. On inserting the LM1894 IC carefully into its socket at position '(IC1)' – the dot at one corner of the package must align with location '1' on the PCB – assembly of the module is complete.

TESTING

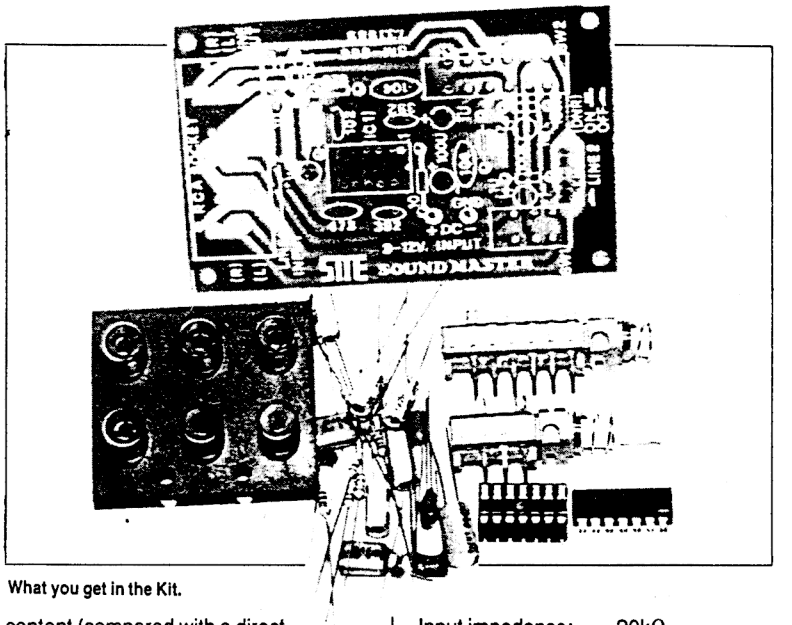
Examine the module and double check that all components are installed correctly. Check for short-circuit or bad solder joints and rectify as necessary. Apply an ohmeter set to lowest 'Ω' range across the supply terminal pins; the black probe is usually positive. If resistance is zero or very low check for solder bridge short-circuits between copper tracks of PCB.

Apply a well smoothed and regulated supply of 9 to 12V DC to the module's power supply pins '+ DC –'. Ensure correct polarity or IC1 will be destroyed! Examples of suitable power supply circuits are shown in Figures 2 and 3. Parts for these are not included in the kit.

With power on measure the voltage across IC1 pins 1 (+) and 7 (–); it should be equal to the supply voltage. With SW1 'out' (select Line 1), and SW2 'out' (DNR selected), check for voltage at both Line 1 input sockets (left-hand pair). There should be no voltage. Repeat test with SW1 'in' at Line 2 input sockets (centre pair), and output sockets (right-hand pair). All sockets should be 0V. If not then one of the 1μF electrolytics is reversed or short circuit.

WHILE IN USE

If serious distortion is heard while the module is switched into use then the input signal level is much too high. Input level must not exceed 3.5V max. If the DNR sound output is lacking in treble



What you get in the Kit.

content (compared with a direct bypassed signal from SW2), then input level may be too low. Input signal level must be at least 300mV for a flat frequency response. The 850Ω and 150Ω resistors control the noise threshold of the circuit and will impair performance if faulty or incorrectly fitted. Their values can be altered for a different noise threshold level if desired.

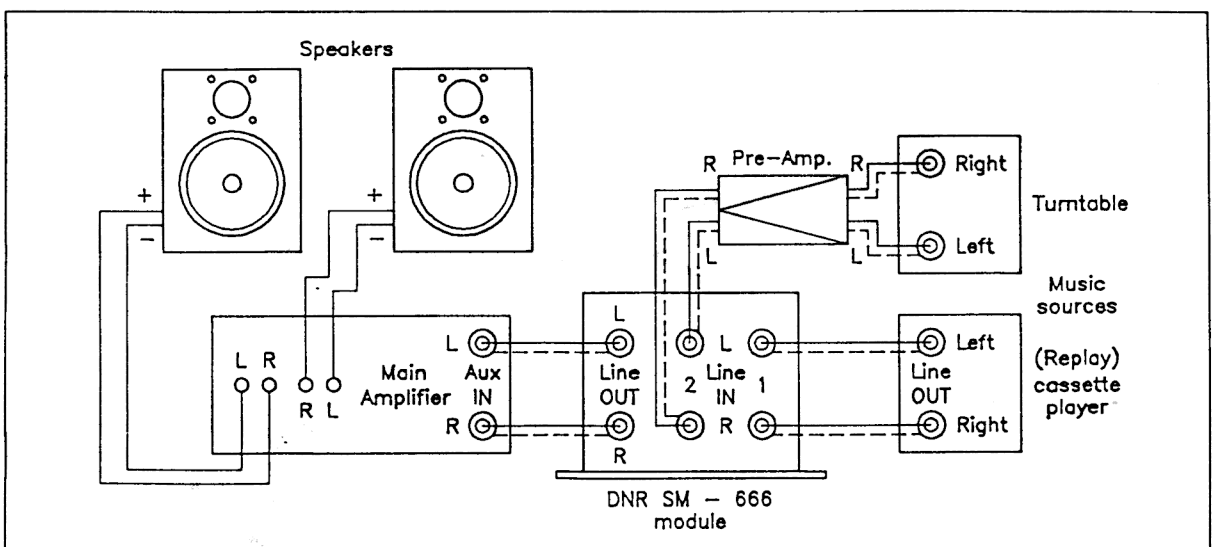
If a significant imbalance between stereo channels is detected then check all four 100kΩ resistors for incorrect value or bad solder connections.

Specification

Supply voltage range:	9 to 12V DC
Average supply current:	25mA
Max. allowable input signal:	3.5V r.m.s. @ 1kHz
Min. input signal for flat frequency response:	300mV
Input impedance:	20kΩ
Noise reduction:	–10dB @ 20kHz –5dB @ 5kHz –4dB @ 1kHz
Total harmonic distortion, 300mV input for full bandwidth of 20kHz:	<0.04%

PARTS LIST

Resistors, 5% carbon		Semiconductor	
10Ω	1	LM1894 (IC1)	1
150Ω	1		
820Ω	1		
100kΩ	4	Miscellaneous	
		14-pin IC socket	1
Capacitors		6-way phono socket	1
1000pF (102)	1	2-pole latch switch	1
3900pF (392)	2	4-pole latch switch	1
0.047μF (473)	1	1.5mm terminal pins	2
0.1μF (104)	2	SM666 PCB	1
1μF 25V elec	5		
100μF 16V elec	1		



Typical Connections to Existing Equipment.

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